

## [GJE203] MATHEMATICS APPLIED TO ENGINEERING

### GENERAL INFORMATION

<b>Studies</b>	DEGREE IN MECHATRONICS ENGINEERING		<b>Subject</b>	?
<b>Semester</b>	2	<b>Course</b>	1	<b>Mention / Field of specialisation</b>
<b>Character</b>	BASIC TRAINING		<b>Language</b>	CASTELLANO/EUSKARA
<b>Plan</b>	2022	<b>Modality</b>	Face-to-face	<b>Total hours</b>
<b>Credits</b>	6	<b>Hours/week</b>	5	90 class hours + 60 non-class hours = <b>150 total hours</b>

### PROFESSORS

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### REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
FOUNDATIONS OF ELECTRICAL ENGINEERING MATHEMATICS I	(No previous knowledge required)

### LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
<b>GJR101</b> - To solve mathematical problems that may arise in engineering, demonstrating the ability to apply knowledge about: numerical algorithms; statistics			x	5,4
<b>G-RTR1</b> - To develop interdisciplinary projects specific to their specialty and of gradual complexity, - becoming aware of respect for human rights and fundamental rights, and analyzing and assessing the impact of the proposed solutions on the SDGs - to acquire and/or apply basic, advanced and /or avant-garde, demonstrating the ability to work in multidisciplinary teams and/or undertake further studies with a high degree of autonomy		x		0,32
<b>G-RTR2</b> - To express information, ideas and the arguments that support them in an orderly, clear and coherent manner, orally and in writing, based on quality information, self-made or obtained from different sources, using inclusive and non-discriminatory language		x		0,28
<b>Total:</b>				<b>6</b>

KC: Knowledge or Content / SK: Skills / AB: Abilities

### SECONDARY LEARNING RESULTS

**RGJ190** [!] *Conocer y aplicar las fases para desarrollar de forma guiada, con los objetivos y la planificación previamente definidos, un proyecto de complejidad técnica acorde con los conocimientos de formación básica de la ingeniería. Reflexiona sobre los cono*

#### LEARNING ACTIVITIES

Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams

CH	NCH	TH
2 h.	2 h.	4 h.

#### EVALUATION SYSTEM

Presentation and defence of exercises, case studies, computer practical work, simulation practical work, laboratory practical work, term projects, end of degree project, master's thesis, challenges and problems

W

100%

#### MAKE-UP MECHANISMS

(No mechanisms)

**Comments:** Continuous assessment. Retake is not foreseen.

**CH - Class hours:** 2 h.

**NCH - Non-class hours:** 2 h.

**TH - Total hours:** 4 h.

**RGJ191** [!] *Contribuir en la estrategia de funcionamiento del equipo priorizando los objetivos comunes, fomentando y valorando la participación de todas las personas y responsabilizándose de las tareas individuales, así como del cumplimiento de plazos.*

LEARNING ACTIVITIES	CH	NCH	TH
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	1 h.	3 h.	4 h.
<b>EVALUATION SYSTEM</b>	<b>W</b>	<b>MAKE-UP MECHANISMS</b>	
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	100%	(No mechanisms)	
<b>Comments:</b> Continuous assessment. Retake is not foreseen.			
<b>CH - Class hours:</b> 1 h.			
<b>NCH - Non-class hours:</b> 3 h.			
<b>TH - Total hours:</b> 4 h.			

**RGJ193** [!] *Redacta una memoria de proyecto clara y concisa utilizando las fuentes de información y estructura de memoria facilitadas, y haciendo un uso correcto, inclusivo y no discriminatorio del lenguaje.*

LEARNING ACTIVITIES	CH	NCH	TH
Development and writing of records, reports, presentations, audiovisual material, etc. on projects/work experience/challenges/case studies/experimental investigations carried out individually and/or in teams	2 h.	1 h.	3 h.
<b>EVALUATION SYSTEM</b>	<b>W</b>	<b>MAKE-UP MECHANISMS</b>	
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	100%	(No mechanisms)	
<b>Comments:</b> Revision and correction of the written report of the semester project			
<b>CH - Class hours:</b> 2 h.			
<b>NCH - Non-class hours:</b> 1 h.			
<b>TH - Total hours:</b> 3 h.			

**RGJ194** [!] *Realiza una presentación oral y defensa del proyecto clara y concisa, haciendo un uso correcto del lenguaje*

LEARNING ACTIVITIES	CH	NCH	TH
Development and writing of records, reports, presentations, audiovisual material, etc. on projects/work experience/challenges/case studies/experimental investigations carried out individually and/or in teams	1 h.	3 h.	4 h.
<b>EVALUATION SYSTEM</b>	<b>W</b>	<b>MAKE-UP MECHANISMS</b>	
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	100%	(No mechanisms)	
<b>Comments:</b> Revision and correction of the written report of the semester project			
<b>CH - Class hours:</b> 1 h.			
<b>NCH - Non-class hours:</b> 3 h.			
<b>TH - Total hours:</b> 4 h.			

**RGJ115** [!] *Conoce y aplica los fundamentos de la estadística y el análisis vectorial a la resolución de problemas de Ingeniería.*

LEARNING ACTIVITIES	CH	NCH	TH
Development and writing of records, reports, presentations, audiovisual material, etc. on projects/work experience/challenges/case studies/experimental investigations carried out individually and/or in teams	2 h.	2 h.	4 h.
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	2 h.		2 h.

Computer simulation exercises, individually and/or in teams	6 h.	11 h.	17 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	16 h.		16 h.
Carrying out exercises and solving problems individually and/or in teams	2 h.	4 h.	6 h.

**EVALUATION SYSTEM**

**W**

**MAKE-UP MECHANISMS**

Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

10%

Individual written and/or oral tests or individual coding/programming tests

Presentation and defence of exercises, case studies, computer practical work, simulation practical work, laboratory practical work, term projects, end of degree project, master's thesis, challenges and problems

10%

**Comments:** Final mark, if applicable, 25% of the mark of the first control point and 75% of the mark of the recovery.

Individual written and/or oral tests or individual coding/programming tests

80%

**CH - Class hours:** 28 h.

**NCH - Non-class hours:** 17 h.

**TH - Total hours:** 45 h.

**RGJ116** [!] *Aplica herramientas matemáticas para la resolución del régimen transitorio y permanente de circuitos*

**LEARNING ACTIVITIES**

**CH**

**NCH**

**TH**

Development and writing of records, reports, presentations, audiovisual material, etc. on projects/work experience/challenges/case studies/experimental investigations carried out individually and/or in teams

3 h.

4 h.

7 h.

Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints

4 h.

12 h.

16 h.

Computer simulation exercises, individually and/or in teams

6 h.

6 h.

12 h.

Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects

33 h.

33 h.

Carrying out exercises and solving problems individually and/or in teams

10 h.

12 h.

22 h.

**EVALUATION SYSTEM**

**W**

**MAKE-UP MECHANISMS**

Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

10%

Individual written and/or oral tests or individual coding/programming tests

Presentation and defence of exercises, case studies, computer practical work, simulation practical work, laboratory practical work, term projects, end of degree project, master's thesis, challenges and problems

10%

**Comments:** Final mark, if applicable, 25% of the mark of the first control point and 75% of the mark of the recovery.

Individual written and/or oral tests or individual coding/programming tests

80%

**CH - Class hours:** 56 h.

**NCH - Non-class hours:** 34 h.

**TH - Total hours:** 90 h.

**CONTENTS**

This course is divided in two parts:

**PART 1: Statistics**

1. Descriptive statistics
2. Probability theory
3. Normal distribution
4. Statistical inference

**PART 2: Applied Mathematics to electric circuits**

1. Time response of first and second order circuits: differential equations.
2. Frequency res

ponse of first and second order circuits.  
Fourier Series and applications.

2.1. Laplace Transform and applications.

2.2.

## LEARNING RESOURCES AND BIBLIOGRAPHY

### Learning resources

Moodle Platform

[!]

Class presentations

### Bibliography

[http://katalogoa.mondragon.edu/janium-bin/janium\\_login\\_opac\\_re\\_Ink.pl?grupo=MECATRONICA12&ejecuta=20&\\_ST](http://katalogoa.mondragon.edu/janium-bin/janium_login_opac_re_Ink.pl?grupo=MECATRONICA12&ejecuta=20&_ST)